

Self-Calibrating Vector Helium Magnetometer (SVHM), Phase I

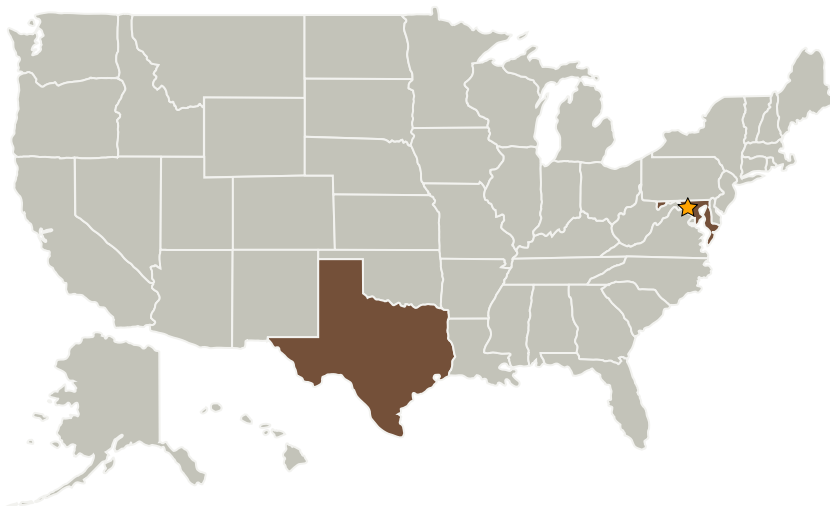
Completed Technology Project (2008 - 2008)



Project Introduction

This Phase I SBIR proposal describes proposed development of a conceptual design for a Self-Calibrating Vector Helium Magnetometer (SVHM) for design and fabrication of a SVHM brass-board model in Phase II. The SVHM instrument is capable of making both scalar and vector component measurements of Earth and planetary magnetic fields. The SVHM innovation is use of the scalar field value to self-calibrate the vector measurements thereby eliminating the three fluxgate vector magnetometers and an independent scalar magnetometer usually required to correct for fluxgate drifts and offsets. The SVM concept was demonstrated under an ESTO IIP contract. The SVHM concept can achieve a dynamic range of $\pm 100,000$ nT, vector and scalar accuracy with self-calibration of 1 nT, and sensitivity of 5 pT /%Hz. Miniaturization of the SVHM instrument to meet volume, power and mass goals will be achieved using fiber-coupled laser pump source and resonance drive, which permits miniaturization of the SVM sensor by reducing helium cell volume, by a factor of 10. The feasibility of designing and fabricating a brass-board SVHM model using advanced laser and digital components will be established in Phase I. A self-calibration and test protocol will be developed for demonstration in Phase II.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Polatomic, Inc.	Supporting Organization	Industry	Richardson, Texas

Primary U.S. Work Locations

Maryland	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert Slocum

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.1 Field and Particle Detectors